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EXAMINER

QUILLEN, ALLEN E

ART UNIT	PAPER NUMBER
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2676

DATE MAILED: 08/14/2003

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/010,524

Applicant(s)

WILLIS ET AL.

Examiner

Allen E. Quillen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1, 3-9, 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Greene, et al, U.S. Patent 5,670,993.

3. Regarding claim 1, representative of claim 9, Greene discloses a method, comprising: detecting a write command (Column 3, lines 30-34) to a frame buffer (*screen buffer*, Column 2, line 57; Column 3, lines 1-18; Column 1, lines 16-33); determining a region in the frame buffer associated with a frame buffer address in the write command (see above, Column 5, lines 48-53); and determining whether the region is the same as a last-modified region (Column 2, lines 2-20). [Claim 9, further] store the write command in memory associated with the graphics engine when the scan out logic accesses the associated region in the frame buffer (see above, Column 7, lines 59-64; *row valid, comparator*, Column 3, lines 19-29; *receives a write command WR, and a write address ADD_{wr} as inputs...*, Column 3, lines 31-32).

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4. Regarding claim 3, Greene discloses the method of claim 1, further comprising: when the region is the same as the last-modified region, refraining from sending the region to the display device until a different region is detected (see above, Column 4, lines 43-50).

5. Regarding claim 4, Greene discloses the method of claim 1, wherein the write command is issued by a graphics engine to the frame buffer (see above, Column 7, lines 59-64).

6. Regarding claim 5, representative of claims 7 and 11, Greene discloses the method of claim 1, wherein the frame buffer comprises a plurality of regions each representing a plurality of pixels on a display device, and wherein the region is one of the plurality of regions (see above, *"addressable units", "redundancy units", 32-bit groups, eight bit groups*, Column 3, lines 1-18).

7. Regarding claim 6, Greene discloses the method of claim 5, wherein the plurality of regions represent the plurality of pixels in a rectangular shape on the display device (see above, *screen rows, columns, 640x480, each screen row is composed of 5,120 bit*, Figure 2, Column 2, line 58 through Column 3, line 7).

8. Regarding claim 8, Greene discloses the method of claim 4, wherein the detecting is carried out by logic connected to the frame buffer and the graphics engine (see above, *row valid, comparator*, Column 3, lines 19-29).

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Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claim 2, 10, 12, 15-17, 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greene, et al, U.S. Patent 5,670,993, in view of Perego, U.S. Patent 5,835,082.

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13. Regarding claim 2, representative of claim 10, 12, 15-17, Greene discloses the method of claim 1, further comprising: when the sending the region to a display device associated with the frame buffer; [Claim 10, Greene further discloses] send the write command to the frame buffer (see above); [Claim 16, Greene] addresses in the writes to region numbers (*screen row information, screen row number*, Column 3, lines 30-67); [Claim 17, Greene] instructing the scan-out logic to copy the one region from the frame buffer [*screen buffer*] to the display device asynchronously from the writes to the frame buffer (*SKIP, NONSKIP, run length encoder, written to ...memory or ignored*, Column 5, line 14 through Column 6, line 27).

[Claim 12, Greene further] discloses an apparatus for writing to a display device, comprising: a frame buffer (*screen buffer*, see above) comprising a plurality of regions, wherein each region represents a respective plurality of pixels on the display device (see above); and logic to accumulate writes by a graphics engine to one of the plurality of regions in the frame buffer until the graphics engine writes to another region of the plurality of regions in the frame buffer (see above);

Greene does not disclose wherein when the graphics engine writes to the another region, the logic is to cause the one region to be written to the display device; and, regarding Claim 2, Greene does not disclose when the region is not the same as the last-modified region, and setting the last-modified region to be the region; and, regarding Claim 10, when the scan-out logic is not accessing the associated region in the frame buffer; and regarding Claim 15, causing the one region to be written to the display device. Perego teaches wherein when the graphics engine writes to the another region, the logic is to cause the one region to be written to the display

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device; and when the region is not the same as the last-modified region, and setting the last-modified region to be the region; when the scan out logic is not accessing the associated region in the frame buffer; causing the one region to be written to the display device. (Column 2, lines 12-20; *As new pixel data is rendered..., full frame buffer, dirty tags for the corresponding compressed data elements are set....*, Column 2, lines 21-34). The motivation for combining frame buffered display and regions with writing to another region, setting the last-modified region to be the region displayed is to reduce bandwidth and power requirements (Column 2, lines 8-12, 42-53). Perego is evidence that at the time of the invention, it would have been obvious to one skilled in the art of frame buffer display to combine the benefits of using regions, write commands and memory addressing as Greene discloses, with regenerating unchanged frames without writing to the frame buffer and setting the last-modified region as the region displayed, as Perego teaches, to reduce bandwidth and power requirements.

14. Regarding claim 26, representative of claims 27-30, Greene discloses an electronic device, comprising: a graphics engine to, for every respective modified region in a set of candidate regions, copy the respective modified region from a frame buffer to a display (see above).

Greene does not disclose when the respective modified region was written to during the copy, mark the respective modified region as modified, and when the respective modified region was not written to during the copy, mark the respective modified region as not modified. Petego teaches marking the modified region as not modified (*tags*, Column 2, lines 10-20). The motivation for combining regions with marking modified regions as not modified is to maintain

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memory coherency for subsequent frame updates, whereby unchanged frames are regenerated directly, thus saving power and bandwidth (Column 2, lines 7-20). Petego is evidence that at the time of the invention, it would have been obvious to combine the benefits of regions and writing to display data, as Greene discloses, with marking written modified regions as unmodified, as Petego teaches, to minimize frame changes, thus saving power and bandwidth.

Claim Rejections - 35 USC § 103

15. Claims 13-14, 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greene, et al, U.S. Patent 5,670,993, in view of Perego, U.S. Patent 5,835,082, with respect to claim 12, in further view of Tsutsumi, U.S. Patent 5,333,016.

16. Regarding claim 13, representative of claims 14, 18, 19-22, Greene and Perego disclose the apparatus of claim 12, wherein the logic comprises a comparator and bit check (see above); a region number of a region currently being written to a frame buffer; wherein connected to scan-out logic, connected to a display device..

Regarding claim 13, Greene does not disclose a plurality of D-type flip-flops;

[Claim 14, further does not disclose] wherein one of the plurality of D-type flip flops is to receive input of a region number of the one region and a clock input to be active when each of the respective writes occurs;

[Claim 18-22, further does not disclose], a first data input, a first clock input to be active when a write has occurred; [Claim 19] a second D-type flip flop, a second data input coupled to a first output of the first D-type flip flop, and a second clock input coupled to compare logic

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output; [Claim 20] a third D-type flip flop, a third data input coupled to a second output of the second D-type flip flop, and a third clock input to be active when the write to the frame buffer has occurred; [Claim 21] compare logic, a first compare data input coupled to the second output of the second D-type flip flop, and a second compare data input coupled to the first output of the D-type flip flop; [Claim 22] the third D-type flip flop, a third output [for displaying data].

Tsutsumi teaches a plurality of D-type flip flops (Figure 2(c), Column 4, line 39 through Column 5, line 22; Column 6, lines 54 through Column 7, line 9). The motivation for combining logic with multiple D [Data] type flip flops and a clock input associated with the write, is to provide a stable display position of the digital image, to reduce it moving up and down by one scan line (Column 4, lines 3-14; Column 7, lines 3-9), as follows: (1) the first two flip flops for a two-stage synchronizing counter with the horizontal synchronizing signal as a trigger and synchronously count two of the horizontal synchronizing signals, thereby allowing the first flip flop to latch the vertical synchronizing signal and the second flip flop causes a time delay of a single scanning interval, so that the signal for generating the trailing edge of the vertical synchronizing signal can be generated at the follow-on synchronizing signal, and (2) the third flip flop is provided between the first and second to create a synchronizing three-stage counter (Column 4, line 58 through Column 5, line 15). Apostol is evidence that at the time of the invention, it would have been obvious to one skilled in the art of the use of display memory using logic and logical methods, to combine the benefits of logical operations, as Greene discloses, with logical D-type flip flops and a clock associated with write, as Apostol teaches, to minimize bus contentions by getting set up in one clock cycle.

Greene does not disclose wherein when the graphics engine writes to the another region, the logic is to cause the one region to be written to the display device; and, regarding Claim 2, Greene does not disclose when the region is not the same as the last-modified region, and setting the last-modified region to be the region; and, regarding Claim 10, when the scan-out logic is not accessing the associated region in the frame buffer; and regarding Claim 15, causing the one region to be written to the display device. Perego teaches wherein when the graphics engine writes to the another region, the logic is to cause the one region to be written to the display device; and when the region is not the same as the last-modified region, and setting the last-modified region to be the region; when the scan out logic is not accessing the associated region in the frame buffer; causing the one region to be written to the display device. (Column 2, lines 12-20; *As new pixel data is rendered..., full frame buffer, dirty tags for the corresponding compressed data elements are set....*, Column 2, lines 21-34). The motivation for combining frame buffered display and regions with writing to another region, setting the last-modified region to be the region displayed is to reduce bandwidth and power requirements (Column 2, lines 8-12, 42-53). Perego is evidence that at the time of the invention, it would have been obvious to one skilled in the art of frame buffer display to combine the benefits of using regions, write commands and memory addressing as Greene discloses, with regenerating unchanged frames without writing to the frame buffer and setting the last-modified region as the region displayed, as Perego teaches, to reduce bandwidth and power requirements.

Claim Rejections - 35 USC § 103

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17. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greene, et al, U.S. Patent 5,670,993, in view of Perego, U.S. Patent 5,835,082, and Thacker, et al, U.S. Patent 5,276,851.

18. Regarding claim 23, Greene discloses an electronic device comprising: a frame buffer comprising a plurality of regions each representing a respective plurality of pixels on a display device; a graphics engine to initiate writes to one of the plurality of regions in the frame buffer; logic to cause the frame buffer to accumulate the writes; and scan-out logic to write the one of the plurality of regions from the frame buffer to the display device when instructed (see above).

Greene does not disclose snoop, or when instructed by the snoop logic. Thacker teaches snoop, or when instructed by the snoop logic (Column 3, lines 41-49). The motivation for combining logic with snooping is to maintain "cache [memory] coherence" address sharing with more than one processor (Column 3, lines 41-49). Thacker is evidence that at the time of the invention, it would have been obvious to one skilled in the art of frame buffer memory write commands to combine the benefits of logic and regions, as Greene discloses, with snooping, as Thacker teaches, in order to maintain a coherent memory addressing with more than one processor (Column 3, lines 44-45).

Greene does not disclose wherein when the graphics engine writes to the another region, the logic is to cause the one region to be written to the display device; and, regarding Claim 2, Greene does not disclose when the region is not the same as the last-modified region, and setting the last-modified region to be the region; and, regarding Claim 10, when the scan-out logic is not accessing the associated region in the frame buffer; and regarding Claim 15, causing the one

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region to be written to the display device. Perego teaches wherein when the graphics engine writes to the another region, the logic is to cause the one region to be written to the display device; and when the region is not the same as the last-modified region, and setting the last-modified region to be the region; when the scan out logic is not accessing the associated region in the frame buffer; causing the one region to be written to the display device. (Column 2, lines 12-20; *As new pixel data is rendered..., full frame buffer, dirty tags for the corresponding compressed data elements are set....*, Column 2, lines 21-34). The motivation for combining frame buffered display and regions with writing to another region, setting the last-modified region to be the region displayed is to reduce bandwidth and power requirements (Column 2, lines 8-12, 42-53). Perego is evidence that at the time of the invention, it would have been obvious to one skilled in the art of frame buffer display to combine the benefits of using regions, write commands and memory addressing as Greene discloses, with regenerating unchanged frames without writing to the frame buffer and setting the last-modified region as the region displayed, as Perego teaches, to reduce bandwidth and power requirements.

Claim Rejections - 35 USC § 103

19. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greene, et al, U.S. Patent 5,670,993, in view of Perego, U.S. Patent 5,835,082, and Thacker, et al, U.S. Patent 5,276,851, as applied to claim 23, in further view of Tsutsumi, U.S. Patent 5,333,016.

20. Regarding claim 24, Greene discloses the electronic device of claim 23, wherein there is display and memory logic (see above).

Greene does not disclose snoop logic comprises a plurality of D-type flip-flops.

Greene does not disclose snoop, or when instructed by the snoop logic. Thacker teaches snoop, or when instructed by the snoop logic (Column 3, lines 41-49). The motivation for combining logic with snooping is to maintain "cache [memory] coherence" address sharing with more than one processor (Column 3, lines 41-49). Thacker is evidence that at the time of the invention, it would have been obvious to one skilled in the art of frame buffer memory write commands to combine the benefits of logic and regions, as Greene discloses, with snooping, as Thacker teaches, in order to maintain a coherent memory addressing with more than one processor (Column 3, lines 44-45).

Tsutsumi teaches a plurality of D-type flip flops (Figure 2(c), Column 4, line 39 through Column 5, line 22; Column 6, lines 54 through Column 7, line 9). The motivation for combining logic with multiple D [Data] type flip flops and a clock input associated with the write, is to provide a stable display position of the digital image, to reduce it moving up and down by one scan line (Column 4, lines 3-14; Column 7, lines 3-9), as follows: (1) the first two flip flops for a two-stage synchronizing counter with the horizontal synchronizing signal as a trigger and synchronously count two of the horizontal synchronizing signals, thereby allowing the first flip flop to latch the vertical synchronizing signal and the second flip flop causes a time delay of a single scanning interval, so that the signal for generating the trailing edge of the vertical synchronizing signal can be generated at the follow-on synchronizing signal, and (2) the third

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flip flop is provided between the first and second to create a synchronizing three-stage counter (Column 4, line 58 through Column 5, line 15). Apostol is evidence that at the time of the invention, it would have been obvious to one skilled in the art of the use of display memory using logic and logical methods, to combine the benefits of logical operations, as Greene discloses, with logical D-type flip flops and a clock associated with write, as Apostol teaches, to minimize bus contentions by getting set up in one clock cycle.

Claim Rejections - 35 USC § 103

21. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greene, et al, U.S. Patent 5,670,993, in view of Perego, U.S. Patent 5,835,082, Thacker, et al, U.S. Patent 5,276,851, and Tsutsumi, U.S. Patent 5,333,016, with respect to claims 23 and 24, in further view of Bell, U.S. Patent 4,958,378.

22. Regarding claim 25, Greene, Perego, Thacker and Tsutsumi disclose the electronic device of claim 24 (see above). Greene does not disclose wherein the D-type flip-flop further comprises an exclusive-OR gate.

Tsutsumi teaches a plurality of D-type flip flops (Figure 2(c), Column 4, line 39 through Column 5, line 22; Column 6, lines 54 through Column 7, line 9). The motivation for combining logic with multiple D [Data] type flip flops and a clock input associated with the write, is to provide a stable display position of the digital image, to reduce it moving up and down by one scan line (Column 4, lines 3-14; Column 7, lines 3-9), as follows: (1) the first two flip flops for a two-stage synchronizing counter with the horizontal synchronizing signal as a trigger and

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synchronously count two of the horizontal synchronizing signals, thereby allowing the first flip flop to latch the vertical synchronizing signal and the second flip flop causes a time delay of a single scanning interval, so that the signal for generating the trailing edge of the vertical synchronizing signal can be generated at the follow-on synchronizing signal, and (2) the third flip flop is provided between the first and second to create a synchronizing three-stage counter (Column 4, line 58 through Column 5, line 15). Apostol is evidence that at the time of the invention, it would have been obvious to one skilled in the art of the use of display memory using logic and logical methods, to combine the benefits of logical operations, as Greene discloses, with logical D-type flip flops and a clock associated with write, as Apostol teaches, to minimize bus contentions by getting set up in one clock cycle.

Greene does not disclose an exclusive-OR gate. Bell teaches an exclusive-OR gate (Column 7, lines 1-34). The motivation for combining logic with logic using an exclusive OR gate is, during writing into memory, the current data and the incoming data can be compared to determine if the new data has changed in a memory cycle (Column 7, lines 4-11). Bell is evidence that at the time of the invention, it would have been obvious to combine the benefits of logic during writing to memory, as Greene disclose, with an exclusive-OR gate, as Bell teaches, to determine in the new data had changed.

Conclusion

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen E. Quillen whose telephone number is (703) 605-4584. The examiner can normally be reached on Tuesday – Friday, 8:30am – noon and 1:00 - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella, can be reached on (703) 308-6829.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Or FAX'd to:

(703) 872-9314 (for Technology Center 2600 only)

Hand delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Sixth Floor (Receptionist), Arlington, Virginia

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number (703) 305-9600 or (703) 305-3800.



Allen E. Quillen
Patent Examiner
Art Unit 2676

***August 9, 2003



Kee M. Tung
Primary Examiner